BEST MODE FOR CARRYING OUT THE INVENTION

Referring in detail to the drawings, Figure 1 the current networking backbone system based on high a bandwidth inter-capital transmission backbone comprised of dedicated circuit based channels, providing connectivity between some of Australia's capital city hubs, and transmission backbones linking out-lying hubs to the capital city hubs. In this networking backbone system, provision of sufficiently high transmission speeds for carriage of data and voice traffic to and from hubs outside the capital cities, is uneconomical and is therefore only attempted when high traffic volumes are to be carried. For example, high transmission speeds between Sydney and out-lying hubs such as Griffith, Armidale, and Dubbo would be uneconomical.

These high volume high traffic links are typically provided by long-haul dense wavelengths division multiplexing (DWDM) transmission systems. These systems distribute bandwidth to terminating sites in the form of whole wavelengths. Such wavelengths have a capacity in the order of 2.5 gigabits per second.

These constraints in transmission backbone speeds have resulted in the current hub connectivity system. In this hub connectivity system it can be seen that high bandwidth connectivity is possible for inter-capital hub connectivity, but for other hubs it is constrained by the distance-dependent pricing of the transmission backbones between these hubs and their respective capital city hubs.

These transmission backbones are provided using, at the primary hubs, DWDM transmission systems capable of transmitting one or many wavelengths. Multiple services may be aggregated into a single wavelength for this transmission.

However, interconnectivity can be provided only at the level of a full wavelength . That is, any terminal must receive or insert a full wavelength or whole optical channel. This means it is only possible to provide bandwidth in large blocks which cannot be economically utilised by smaller traffic generators, in particular , Australian towns, smaller than the capital cities.

In contrast to the current networking backbone system illustrated in Figure 1, and referring specifically to Figure 2, it will now be seen as between Brisbane and

Sydney that there are two parallel connections termed Corridor 1 and Corridor 2 and that in each of these, there are a number of intermediary hubs from which further direct connections can be made to more localised locations.

The same can be seen to be that position with connections between Sydney and Melbourne where there are now two routes, namely Corridor 3 and Corridor 4, which respectively go through a number of smaller hubs and towns, for instance Corridor 3 goes through Wollongong, and then to Canberra, Albury, Wangaratta and Corridor 4 goes from Sydney to Shepparton, Bendigo, Gisborne and then Melbourne.

A single Corridor 5, connects from Melbourne through Adelaide to Perth, and in this case, an intermediary connection between Melbourne and Adelaide can be in Geelong and Ballarat.

An intermediary connection between Adelaide and Perth can be at Kalgoorlie, but of course, there can be a number of further intermediary hubs which will be of relatively small cost and provide those connections with very high quality and high speed voice and digital communication.

These primary hubs are connected by conventional DWDM transmission platforms.

With a secondary connectivity mesh which may be at a somewhat lesser speed than would be available through light transmitting fibres, there can now be seen to be a number of interconnections that can be made which provide still very high quality communication even though the quantity of traffic might be less.

Figure 3 shows high bandwidth connectivity for both secondary and tertiary hubs that now becomes possible again at very significant cost savings.

Figure 4 illustrates how the networking backbone corridors system can be used to incorporate more hubs and to create bandwidth aggregation points for connections to multiple customers.

It is then possible to establish an extended high bandwidth hub connectivity system such as illustrated in Figure 5.

The same method of high bandwidth networking backbone corridors can further be applied to the geographic area of a capital city. Figure 6 illustrates how this method can be applied to the city of Melbourne, thereby further extending the national and regional networking backbone corridors system, to include a specific metro networking backbone corridors system that is appropriately integrated with the former.

Figure 7 shows the physical connectivity in a network including four tiers, where a further set of hubs, called in this instance neighbourhood hubs, is included. A first hierarchical tier of hubs, P1 and P2, called primary hubs is connected physically by optical fibre, via a number of hubs of a second hierarchical tier called secondary hubs, S1-3. A third hierarchical tier of hubs, T1-6, called tertiary hubs is connected to each other or to secondary hubs. The neighbourhood hubs, N1-16 form a fourth hierarchical tier.

The logical connectivity for this physical system is shown in figure 8. Logically each hub in a tier has connections to two hubs in the next higher tier.

The tertiary hubs can be connected by using currently installed infrastructure except that the connection's distance to a main hub or to a sufficiently high speed connecting hub is very much less than has hitherto been the case in existing telecommunication networks.

What can now be seen to have been provided is a communication network method and installation which provides for a economical communications carriage to carry both data and voice and voice like signals solely as addressed digital logic packets by providing this at least in a backbone system and distributed mesh networks such that the speed of communication will be sufficient to provide very good voice or other equivalent analogue signal transmissions as well as data.

This is provided by a transmission speed of at least approximately 2.5 gigabits per second along a main backbone and uniquely capable, and in fact having intermediary connections providing for mesh communication networks both for primary and secondary networks where secondary would be normally at a transmission speed that might be a proportion only of the main backbone communication bandwidth.

As would be appreciated by those skilled in the art, this transmission speed of 2.5

gigabits per second is provided in a DWDM system by using a full wavelength . Thus the proportion only of the main backbone communication bandwidth is provided by a part only of a bandwidth. It is therefore the case that secondary, tertiary and neighbourhood hubs are capable of dropping and inserting from and to the main back-bone, communication channels which are less than a full wavelength.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognised that departures can be made within the scope of the invention, which is not to be limited to the details described herein but is to be accorded the full scope of the appended claims so as to embrace any and all equivalent devices and apparatus.

CLAIMS

1. A data and voice digital communication network installation providing a backbone communication bandwidth including optical transmission means solely through addressed digital logic packets of at least 2.5 gigabits per second, being the capacity of one wavelength, between geographically substantially dispersed locations being primary hubs, and having at least one light transmitting fibre through which the transmission is effected with means at respective ends, being the primary hubs, of the fibre to effect an input and output of the communication signals at a rate which is at least the said bandwidth, and further having at least one intermediate means being a secondary hub which is substantially geographically dispersed from said locations of the primary hubs to effect an input and output through addressed digital logic packets into the fibre, and means to then effect transmission of and signals from said secondary hub to a further geographically dispersed location at a rate which is less than the said bandwidth between said primary hubs, said secondary hub being adapted to provide this lesser bandwidth rate by providing access to a proportion of the backbone communication bandwidth which is less than one wavelength.

2. A data and voice digital communication network installation including a plurality of packet communication networking hubs, logically configured in a hierarchy of at least two tiers, a transmission backbone network linking said hubs, including at least one light transmitting fibre with means to extract signals from and apply signals to the fibre which are at least a proportion of end to end signals being carried by the fibre said proportion being less than a single wavelength being carried by the transmission backbone, said signals being extracted to and received from the packet communications networking hubs, at a plurality of selected locations, including at least one which is not located at a primary hub, wherein the logical configuration of a given hub is substantially independent of its physical connectivity to the transmission backbone network.

3. A data and voice digital communication network installation as in claim 2, wherein a logical connectivity scheme is constructed and is operated so that it provides a first logical connectivity mesh linking each of a plurality of hubs

comprising a first hierarchical tier of hubs, at least one second connectivity mesh linking each of a plurality of hubs comprising a second hierarchical tier of hubs to at least two hubs of said first tier.

4. A data and voice digital communication network installation as in claim 3, wherein said logical connectivity scheme further includes point to point connectivity between each of a plurality of hubs comprising a third hierarchical tier of hubs and at least one hub from a higher hierarchical tier and point to point connectivity between any hub and selected locations external to the communication network scheme.

5. A method of operating a data and voice digital communication network including a plurality of packet communication networking hubs, logically configured in a hierarchy of at least two tiers, a transmission backbone network linking said hubs, including at least one light transmitting fibre, extracting signals from and applying signals to the fibre which are at least a proportion of end to end signals being carried by the fibre, said proportion being less than a single wavelength being carried by the transmission backbone, said signals being extracted to and received from the packet communications networking hubs, at a plurality of selected locations, including at least one which is not located at a primary hub, wherein the logical configuration of a given hub is substantially independent of its physical connectivity to the transmission backbone network.

6. A data and voice digital communication network as in claim 5, further including the construction and operation of a logical connectivity scheme including a first logical connectivity mesh linking each of a plurality of hubs comprising a first hierarchical tier of hubs, at least one second connectivity mesh linking each of a plurality of hubs comprising a second hierarchical tier of hubs to at least two hubs of said first tier.

7. A data and voice digital communication network as in claim 6, wherein said logical connectivity scheme further includes point to point connectivity between each of a plurality of hubs comprising a third hierarchical tier of hubs and at least one hub from a higher hierarchical tier and point to point connectivity between any hub and selected locations external to the communication network scheme.

8. A data and voice digital communication network installed in Australia providing for at least one communication network between Sydney and Melbourne which provides for a bandwidth of at least approximately 2.5 gigabits per second and has at least one intermediate node where the communication method is solely directed toward addressed digital packet transmission where both the digital and voice communication over such a backbone connection is by way of such addressed digital logic packets, wherein the intermediate node is adapted to provide access to a proportion of the backbone bandwidth being less than a full wavelength.

9. A data and voice digital communication network installation covering the geography of Australia providing a backbone communication bandwidth of at least 2.5 gigabytes/second between geographically substantially dispersed locations being primary hubs, and having at least one light transmitting fibre through which the transmission is effected with means at respective ends, being the primary hubs, of the fibre to effect an input and output of the communication signals at a rate which is at least the said bandwidth, and further having at least one intermediate means being a secondary hub which is substantially geographically dispersed from said locations of the primary hubs to effect an input and output through addressed digital logic packets into the fibre, and means to then effect transmission of and signals from said secondary hub to a further geographically dispersed location at a rate which is less than the said bandwidth between said primary hubs, said secondary hub being adapted to provide this lesser bandwidth rate by providing access to a proportion of the backbone communication bandwidth which is less than one wavelength.

10. A data and voice digital communication network substantially as described with respect to any one of the embodiments in the specification with reference to and as illustrated by the accompanying illustrations with respect to that embodiment.